

Dentsply/Caulk Company. As the name indicates, Principle's composition is based on that of compomer restorative materials. Its powder contains strontium aluminofluorosilicate glass, sodium fluoride, and initiators. In addition to initiators and an inhibitor, the liquid contains water, resin, polymerizable methacrylate/carboxylic acids, and a polymerizable acrylate/phosphate (PENTA). The small amount of water is included in the liquid to initiate an immediate acid/base reaction upon mixing.



This reaction is purported to give Principle the ability to form an immediate chemical bond to tooth structure. Dentsply/Caulk claims that the cement undergoes two other separate reactions. When the powder and liquid are mixed, a self-cure polymerization of the methacrylates begins that causes the cement to achieve a "gelled" state within 2 minutes under intraoral conditions. Because photoactivators are present in the cement, excess cement at the margins can be light activated to hasten the development of the gelled state. Once in the gelled state, excess Principle is purportedly easy to remove.

Principle is recommended for the luting of: conventional porcelain-fused-to-metal (PFM) restorations, PFM crowns with porcelain margins, all-metal crowns, gold inlays and onlays, and prefabricated and cast endodontic posts. It is contraindicated for: cast-ceramic/porcelain/resin composite restorations, porcelain jacket crowns, resin-bonded (i.e., Maryland) bridges, and porcelain veneers. Immediately prior to luting, the prepared tooth is cleaned to remove temporary cement and other debris; no etching or other pre-treatment is recommended by Dentsply/Caulk. The cement powder is available in two shades, tooth-colored and translucent, however only the tooth-colored powder is provided in the Introductory Kit. A Material Safety Data Sheet (MSDS) and graphics-containing summary instruction card are supplied with the product.

Manufacturer:

L.D. Caulk
L.D. Caulk Division
Dentsply International, Inc.
P.O. Box 359
Milford, DE 19963-0359
(800) 532-2855
(302) 422-4511
(800) 788-4110 FAX
www.caulk.com

Suggested Retail Price:

\$70.00 Principle Introductory Kit (product number 674100)
-one 12-g bottle of tooth-colored powder
-one 6-g bottle of liquid
-powder dispensing scoop
-mixing pad

Government Price:

\$38.50 Principle Introductory Kit (product number and contents as listed above)

ADVANTAGES:

- + Film thickness (36 microns) is comparable to that of other resin-based cements.
- + Working time is more than adequate; clinicians did not have to rush to complete the cementation process.

- + Gelled state makes it easy to remove excess cement from margins.
- + Conversion to gelled state can be hastened by use of visible light curing unit.
- + No etching or bonding of preparation recommended before use.
- + Adequately radiopaque.
- + Graphics-containing instruction card was helpful.
- + Powder/liquid ratio is graphically portrayed on side of bottles.
- + Expiration date and lot number are stamped on bottles.
- + Packaged with a Material Safety Data Sheet (MSDS).

DISADVANTAGES:

- Not recommended for all types of restorations.
- Bond strength measured by DIS was lower than the value claimed by Dentsply/Caulk.
- Not available in capsule form; users disliked dispensing and hand mixing.
- Evaluators did not believe Principle had significant advantages compared to other currently-marketed cements.

SUMMARY AND CONCLUSIONS:

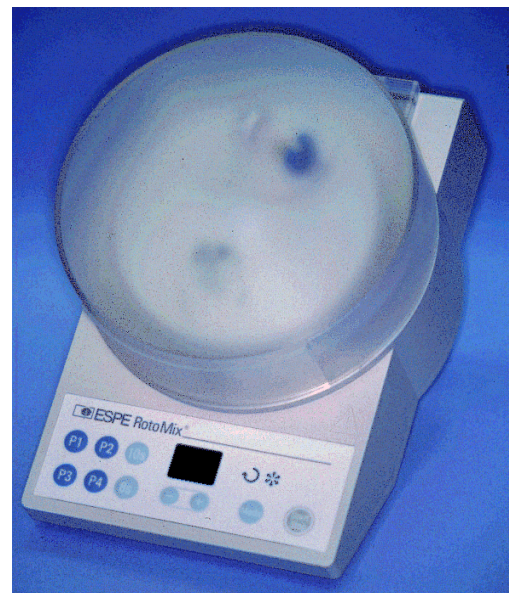
Laboratory testing showed that Principle Compomer Cement has an acceptable film thickness, an appropriate working time, and is adequately radiopaque. The gel stage it enters after placement in the mouth makes it easy to remove excess cement at the margins. Use is straightforward because no acid or bonding agent treatment is done to the preparation prior to luting. Principle is not recommended for all types of restorations (contraindicated for all-ceramic, porcelain and resin composite restorations as well as "Maryland Bridges," porcelain veneers, and porcelain jacket crowns). Principle's bond strength as measured by DIS was only about 1/4 of the value claimed by Dentsply/Caulk. Users strongly disliked the fact that the product had to be hand mixed and felt it had few significant advantages compared to other luting cements. **Principle Compomer Cement** is rated **Acceptable** for use by the federal dental services.

(Col Charlton)

58-13 RotoMix

(Project 98-45)

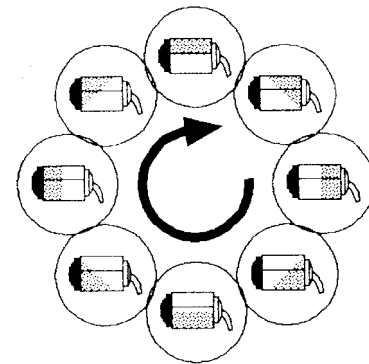
The RotoMix is a new single-speed capsule mixer marketed by ESPE that features a unique "rotational centripetal/centrifugal" mixing cycle as compared to current linear oscillating models. ESPE maintains that newer high-viscosity, condensable glass ionomers may tax the mechanical function of present triturators which could result in air voids in the mixed material. ESPE claims that the RotoMix mixes the powder and liquid contents of the capsule with "rotational centripetal/centrifugal" forces. This rotational mixing principle is said to minimize material air voids, simplify handling, and reduce noise level and mixing time. Although developed for use with glass-ionomer and resin capsulated products, ESPE states that the RotoMix is compatible with all capsules that are of the correct size and weight to be fitted into the capsule holder.



During mixing, the capsule revolves in an 80-cm orbit while the capsule holder rotates around its own axis. As the platform and capsule holder rotate in opposite directions, the capsule remains horizontal. ESPE claims that the resultant centrifugal force is applied uniformly inside the capsule. (See the line drawing on the following page)

After mixing, the capsule does not rotate on the platform while being centrifuged. Rather, it spins for

approximately three seconds with its plunger orientated outward. This causes centrifugal force to be directed toward the capsule plunger. ESPE claims that air voids are virtually eliminated as mixed material is collected on the side of the plunger rather than into the nozzle orifice. The company also states that this homogenized mixing requires less manual pressure to extrude the mixed material from the capsule.



The RotoMix unit is composed of three main subcomponents. The first is a microprocessor-controlled power control board that controls all RotoMix functions. The RotoMix has only one frequency setting (3000 cpm). The microprocessor has two factory-preset time programs (eight and ten seconds), while four additional mixing time settings can be programmed into the machine by the user. ESPE states that speed monitoring is controlled by an optoelectronic monitoring mechanism. If speed should drop below 2440 rpm, mixing will cease and an error code will be displayed. The product's technical information makes no mention about the need for calibration. The RotoMix weighs 8 lb., 13 oz. And is 8 9/32" deep by 9 11/16" wide by 7 3/32" high.

Manufacturer:

ESPE America
1710 Romano Drive
PO Box 111
Norristown, PA 19494-0111
(800) 344-8235
(800) 782-1571
(610) 277-3800
(800) 458-3987 FAX
www.espeusa.com

Suggested Retail Price:

\$675.00 RotoMix (Item number 076310)

Government Price:

\$440.00 Rotomix (Item number as listed above)

ADVANTAGES:

- + Produces consistent mixes of materials.
- + Mixing chamber is isolated from internal mechanical compartment, which facilitates cleanup of capsule leaks.
- + Quietest triturator that DIS has evaluated.
- + Capsule placement and removal can be accomplished with one hand.
- + Compatible with all tested capsule designs.
- + Meets all electrical safety requirements.
- + Set mixing times and frequency are accurate.
- + No undue vibration during operation.
- + Comparable in price to other triturators.
- + Securely packed for shipment.
- + Safety switch prevents mixing while mixing chamber lid is raised.

DISADVANTAGES:

- May require some time before manufacturers develop optimal mixing times for this unit.
- Not currently recommended by manufacturer for triturating amalgam.

SUMMARY AND CONCLUSIONS:

The RotoMix is a single-speed device for mixing precapsulated resin composites and glass-ionomer products. The unit utilizes a unique circular/centrifugal mixing cycle that is claimed to produce less porosity in mixed materials. The RotoMix is well designed and well built and it passed all electrical safety tests. The RotoMix displayed accurate mixing times and frequency, was compatible with all capsule designs tested, and was the quietest triturator that DIS has evaluated. It did not produce undue vibration during operation. Clinical users confirmed that the RotoMix produced consistent mixes and capsules were easy to place and remove. Evaluators did discover that the RotoMix produced clinically acceptable mixes of amalgam, although ESPE does not currently recommend it for mixing amalgam. As with any new technology, some time may be required before other manufacturers develop product-mixing times for the RotoMix. The price of this unit is comparable to those of other triturators. The **RotoMix** is rated **Acceptable** for use by the federal dental services.

(Lt Col Roberts)

58-14 Temphase Temporary Crown and Bridge Material**(Project 99-01)**

Temphase is a chemically-cured bis-methacryl resin composite recommended by Kerr for fabrication of short-term and long-term provisional restorations. Kerr claims that Temphase is filled 41 percent (presumably by weight) with silica and silane-treated barium glass particles. Its small (0.6-micron) average filler particle size is purported to make it easy to polish and provide excellent esthetics. Among its other claimed advantages are easy repairability (with a supplied flowable resin composite) and a viscosity that makes it stackable and prevents slumping. The product is available in 5 Vita-indexed shades (A2, A3.5, B1, C2, D2), two setting times (3-minute Fast and 5-minute Regular), and is mixed and dispensed using an automix gun dispenser. Included in the kit are a syringe of separating gel that is used when Temphase is used over a core or liner of resin or glass ionomer to prevent the surfaces from adhering as Temphase cures. As is typical of Kerr products, Temphase comes in a compact, plastic, "tackle box" that snaps shut and has a handle for carrying. A plastic card that uses graphics to summarize product use is also provided.

**Manufacturer:**

Kerr Corporation
1717 W. Collins Avenue
Orange, CA 92867-9880
(800) 537-7123
(714) 516-7400
(714) 516-7633 FAX

Suggested Retail Price:

\$176.00 Temphase Deluxe Introductory Kit, Fast Set (item number 28793) or Regular Set (item number 28776) contains:

- two 72-g cartridges (shades A2, A3.5)
- 24 mixing tips
- two 1-g syringes of Revolution Flowable Resin Composite (A2, A3.5)
- 20 Revolution syringe tips
- 1 syringe of Relief Separating Gel

- 10 Relief syringe tips
- 1 Extruder Gun

\$71.40 Temphase Refill (available in five different shades, each shade and setting time with a separate product number)
 -one 72-g cartridge
 -12 mixing tips

Government Price:

\$153.81 Temphase Deluxe Introductory Kit (contents and item numbers as listed above)

\$62.42 Temphase Refill (as listed above)

ADVANTAGES:

- + Produces well-fitting, esthetic provisional restorations.
- + Exhibits little, if any odor.
- + Gives off less heat during setting than standard acrylics.
- + Adequately-long working times.
- + Fast polymerization means provisional restorations can be finished/polished without wasting chair time.
- + One-third less expensive per gram than Integrity (Dentsply/Caulk) and Iso-Temp (3M).
- + Automix gun system makes mixing fast, easy, and minimizes porosity.
- + Shades in Introductory Kit were sufficient for most clinical cases treated during the evaluation.
- + Provided with separating gel to keep Temphase from adhering to resin and glass-ionomer cores/bases.
- + Comes in compact, "tackle box" kit; shuts securely and is very portable.
- + Lot number and expiration date are stamped on each component in kit.

DISADVANTAGES:

- Has marked air-inhibited layer that makes finishing/polishing difficult.
- Fast-Set version sets abruptly; users must carefully time stent removal to prevent locking into undercuts.
- Is brittle; increases chances that the restoration will fracture.
- Instruction card is very basic and recommended procedure times on it can be confusing.
- Flowable repair resin is too thin for margin repair.
- Product is only minimally radiopaque; detection on radiograph is difficult.

SUMMARY AND CONCLUSIONS:

Clinical users reported that Temphase produced restorations that fit well and were very esthetic. Only two shades are in the Introductory Kit, however they were adequate for most cases the clinicians treated. The automix dispenser system makes it easy to mix the product and produced homogeneous mixes, however it is important to bleed the cartridge prior to use to ensure the base and catalyst ports are not clogged. Users were inconvenienced by some of the product's characteristics, however. A pronounced air-inhibited layer made finishing and polishing problematic at times. The repair material (Revolution Flowable resin), while working well for adding thickness to provisionals, was too thin for margin repairs or add-ons. As with other resin composites, Temphase is brittle and inappropriate for long-span provisionals. Because the Fast-Set version sets abruptly, you must be careful to remove it from the preparations before it locks into undercuts. Finally, the summary instruction card lists procedure times that are open to different interpretations which can lead to difficulties during use. **Temphase Temporary Crown and Bridge Material** is rated **Acceptable** for use by the federal dental services.

(Col Charlton)

58-15 Prime & Bond NT Dual Cure

(Project 99-02)

Prime & Bond NT Dual Cure is a fifth-generation (i.e., "one-component") dentin bonding agent marketed by the Dentsply/Caulk Company. According to the manufacturer, it is distinguished from other "one-component" bonding agents in that it contains extremely small filler particles. These 7-nanometer fillers are the basis for including "NT" in the product's name: "NT" for "nano-technology." Although Prime & Bond NT Dual Cure is described as a "single-component" product, it consists of a 34% phosphoric acid etchant, an acetone-based, nanofilled Adhesive Resin, and an acetone/ethanol-based, sulfinate Self Cure Activator. For doing direct bonding of resin composites, compomers, and veneers, only the etchant and bonding resin are used. For bonding indirect restorations such as inlays, onlays, and crowns, the bonding resin is combined 1:1 with the Self Cure Activator. This converts the material into a dual-cure adhesive. Prime & Bond NT Dual Cure is also recommended for amalgam bonding and as the preparatory step before the cementation of endodontic posts with a resin cement.



The advantages of nanofiller technology are purportedly that it strengthens the adhesive and hybrid layers which increases bond strength and improves marginal integrity. Other improvements to the product's composition include incorporation of a small resin to better infiltrate the dentin surface, a crosslinking agent to strengthen the adhesive, and a higher overall resin concentration which makes it possible to achieve adequate coverage with only one application.

The first step in applying Prime & Bond NT is to etch the enamel and dentin for 15 seconds with the acid etchant. The etchant is removed with thorough rinsing for 10 seconds and the tooth structure is blot dried with a moist cotton pellet. Prime & Bond NT Adhesive is generously applied to the tooth structure for 20 seconds, air dried for 5 seconds, and light activated for 10 seconds. When used for indirect bonding, a 1:1 mix of Adhesive and Self Cure Activator is applied for 20 seconds, dried, and light activated.

Manufacturer:

L.D. Caulk Division
Dentsply International, Inc.
P.O. Box 359
Milford, DE 19963-0359
(800) 532-2855
(302) 422-4511
(800) 788-4110 FAX

Suggested Retail Price:

\$185.60 Prime & Bond NT Dual Cure (item number 634353) contains:
-one 3-mL syringe of 34% phosphoric acid etchant
-one 4.5-mL bottle of Prime & Bond Adhesive Resin
-one 4.5-mL bottle of Self Cure Activator
-plastic brush handle and mixing well

-disposable brush tips and syringe tips

Government Price:

\$102.05 Prime & Bond NT Dual Cure (item number and contents as listed above)

ADVANTAGES:

- + Application process is simple and very fast.
- + High bond strength to dentin (31.3 MPa as measured by DIS).
- + Inclusion of Self Cure Activator makes product suitable for indirect bonding.
- + No offensive odor.
- + Instructions are clear with adequate technique description.
- + Is provided with laminated instruction cards.
- + Expiration dates and lot numbers are stamped on individual components.
- + Recommended storage conditions are provided on box.
- + Is provided with a Material Safety Data Sheet (MSDS).

DISADVANTAGES:

- Product is not all-inclusive; basic bonding components such as silane, porcelain etchant, and Dentsply's proprietary Amalgam Bonding Base and Catalyst are not provided.
- Self Cure Activator is difficult to dispense in a controlled fashion because of its low viscosity.
- Box is larger than it needs to be.

SUMMARY AND CONCLUSIONS:

Prime & Bond NT is one of the few "one-component" (ie, "fifth-generation") bonding products that is marketed for indirect as well as direct bonding. This is possible because its Self Cure Activator enables the user to convert the light-activated adhesive into a dual-cure adhesive. However, as is the case with most other "one-component" bonding agents, the product does not come with all the components called for in the manufacturer's instructions. Unless the required components are purchased separately, this limits the product's range of uses. User friendliness is always an appealing feature for bonding agents and Prime and Bond NT does well in this regard. Of eight "one-component" products tested by DIS, Prime & Bond NT was the second fastest to apply, which indicates it is simple and straightforward to use. It also produced a very high bond strength. In fact, this is the first bonding agent tested by DIS that exhibited a bond strength value greater than the value claimed for it by its manufacturer. The product's main distinguishing feature is that it is nanofilled, however laboratory and clinical studies need to be performed to assess if this type of filler results in better clinical performance. **Prime & Bond NT** is rated **Acceptable** for use by the federal dental services.

(Col Charlton)

58-16 Assistina 301 Plus

(Project 98-28)

The W&H Assistina 301 Plus is a small, counter-top unit that automatically cleans the air/water spray channels and lubricates the moving parts of contra-angle handpieces, straight handpieces, turbines, airmotors, and air-driven dental scalers. It is manufactured by W&H Dentalwerk (Austria) and imported and distributed in the United States by Adec. A variety of coupling adapters makes it possible to clean and lubricate a range of different manufacturers' handpieces and motors. Depressing the program

button for approximately two seconds activates the Assistina. Once activated, cleaning fluid is flushed through the air and water spray channels, then service oil is applied to the internal rotating parts, and finally, compressed air purges the air and water channels and internal parts of cleaning fluid and service oil, respectively. Since the handpiece is totally enclosed by the Assistina during operation, aerosolized oil and cleaning fluid is trapped by absorbent fleece pads and an exhaust filter. This minimizes the release of aerosols and messy lubricants into the work area. The Assistina operates on clean compressed air and does not require electricity. The external compressed air source must be between 60 and 145 psi. An internal pressure regulator reduces the compressed air to the proper pressure for optimum operation. The Assistina measures 8.8"H x 7.5"W x 16.3"D and weighs six pounds.



Manufacturer:

W&H Dentalwerk (Austria)
Adec, Inc.
2601 Crestview Drive
Newberg, OR 97132
(800) 547-1883
(503) 538-9471
(503) 537-2702 FAX

Suggested Retail Price:

Assistina 301 Plus: \$1820.00

Includes: Assistina 301 Plus, cleaning liquid, service oil, aerosol mist filter, 4-hole adapter, two funnels, air connection hose with screw connector and air filter, five layers of adsorbent fleece, and owner's manual including operating instructions.

Cleaning Fluid	\$26.00
Service Oil	\$73.00
Exhaust Filter	\$57.00
Coupling Adapters	\$78.00 to \$150.00

Government Price:

Assistina 301 Plus: \$940.52

Includes: Same as above.

Cleaning Fluid	\$15.44
Service Oil	\$43.36
Exhaust Filter	\$33.86
Coupling Adapters	\$46.33 to \$73.00

ADVANTAGES:

- + Durable, well-designed unit; no electrical power required.
- + One button operation automatically delivers correct amount of lubricant and cleaner.
- + Adapters allow use with a range of different manufacturers' handpieces and attachments.
- + Handpiece is enclosed during lubrication to control the release of aerosolized lubricants.
- + Improved the operational life of Lares 557 highspeed handpieces.
- + Performed as well as the proprietary lubricant for Midwest Tradition highspeed handpieces.
- + Function indicators confirm the unit is operating correctly.

- + Site level glass tubes show oil and cleaning fluid levels.
- + Color-coded caps on replacement service oil and cleaner containers match the Assistina refill chambers to aid in correct refilling.
- + Routine maintenance is limited to periodic oil and cleaner replenishment and replacement of aerosol mist filter every 7000 uses.

DISADVANTAGES:

- Higher initial start-up expense compared to traditional aerosol can or dropper bottle lubricant delivery.
- Requires compressed air supply.
- Shortened the operational life of Kavo 642B highspeed handpieces.

SUMMARY AND CONCLUSIONS:

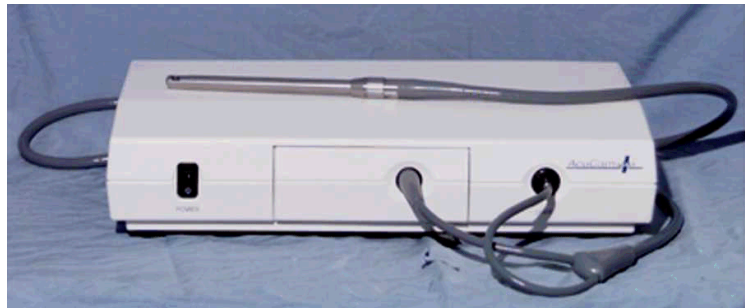
The Assistina 301 Plus is a well-designed, easy-to-use, automatic lubrication and cleaning unit. Simple one-button operation activates the unit to deliver the correct amount of cleaning fluid and service oil, then automatically purges the handpiece of excess cleaning fluid and lubricant. Adaptors are available to allow use of a range of different manufacturers' handpieces and attachments with the unit. Compared to the manufacturer's proprietary lubricants, the Assistina improved the longevity of the Lares 557 turbines, produced similar longevity with Midwest Tradition turbines, but reduced the longevity of Kavo 642B turbines. The Assistina 301 Plus was used daily in the DIS laboratories for over three years as part of several handpiece studies as well as this particular evaluation. During that time it functioned flawlessly without any mechanical failures. The **W&H Assistina 301 Plus** is rated **Acceptable** for use by the federal dental services.

(Col Leonard, Mr. King)

58-17 Acucam Concept III

(Project 99-30)

The Acucam Concept III is a digital intraoral camera system. The system is equipped with a single, stainless-steel handpiece with a charge-coupled device (CCD) image sensor that has intraoral, extraoral, and macro settings. The ultra-thin, lightweight balanced handpiece has a 72°-wide angle lens for increased depth of field and rapid examination screening. The focus control provides a focal range from 1-mm to infinity, with a



15°-retroflex direction of view for total oral access and visualization. A non-inverting roof prism presents images in their true clinical orientation. The scratch resistant sapphire window with twin light guide design provides uniform illumination and enhanced depth perception. A Digital Signal Processor and Docking Station Fiberoptic Illumination System provide automatic exposure control and reduced glare and reflection. The camera processor/handpiece module can be removed from the docking station for transport between operatories if desired. Each system includes a color printer, monitor, and compact mobile cart. Disposable sheaths for barrier protection are provided for infection control.

Manufacturer:

Dentsply New Image
2283 Cosmos Ct.
Carlsbad, CA 92009
(800) 634-7349
(760) 930-9900
(760) 930-9993 FAX

Suggested Retail Price:

\$9,970.00

Government Price:

\$6,140.00

ADVANTAGES:

- + Instantaneous image.
- + Excellent image quality.
- + Greater magnification and resolution compared to a conventional 35-mm intraoral camera.
- + Ease of operation; simple to repeat captured image from a different angle.
- + Captured image can be printed, or integrated with digital radiographic image.
- + Ability to place captured image side-by-side with digital radiographic image for patient education and comparison.
- + Excellent diagnostic and visualization aid for tooth fractures.
- + Facilitates patient education and treatment planning.
- + Ability to export stored images into lectures, notes, or e-mail to consultants.
- + Excellent illumination for osseous defects, root-ends.
- + Fairly compact.

DISADVANTAGES:

- Focusing was cumbersome.
- Viewed colors not rendered true-to-life.
- Quality of printed color image degraded over time.
- Cord was too short.
- Software was not user-friendly.
- Minimal memory provided with video card.

SUMMARY AND CONCLUSIONS:

The Acucam Concept III is a digital intraoral camera. The camera was easy to use, produced images of excellent quality, and had magnification and illumination features that significantly improved diagnostic ability. The system proved to be an excellent patient education tool, and instant images reduced chairside time. The system is capable of exporting images for lectures, notes, consults, and can be integrated with digital radiographic images. The major drawbacks were a short cord length, difficulty with focusing, and captured images that had less than life-like colors. The **Acucam Concept III** is rated **Acceptable** for use by federal dental services.

(Col Bartoloni)

58-18 NI-DX Digital Radiography System**(Project 98-26)**

The NI-DX is a digital radiography system that produces radiographic images which can be displayed on a computer monitor within seconds via a connected sensor. A conventional radiographic generator produces x-ray photons, which the sensor converts to an electrical signal that is relayed to the computer. The sensor is 39.3 mm long by 29.5 mm high by 8.8 mm wide. Sensor features include: rounded corners, easy disinfection (or barrier protection), and a 9-foot cord. The sensor can be positioned intraorally using a standard x-ray film holder. The system reduces patient radiation exposure and eliminates conventional radiographic film and processing equipment/chemicals. The software package allows the image to be enhanced using the following features: zoom, brightness, contrast, colorize, emboss, and smooth. The NI-DX can be purchased with a computer, or the software and sensor can be purchased separately and added to an existing computer.

Manufacturer:

Dentsply New Image
2283 Cosmos Ct.
Carlsbad, CA 92009
(800) 634-7349
(760) 930-9900
(760) 930-9993 FAX

Suggested Retail Price:

\$8,695.00 (without computer)

Government Price:

\$6,956.00 (without computer)

ADVANTAGES:

- + Immediate image.
- + Reduced patient radiation exposure.
- + Eliminates the need for processing, chemicals, hazardous waste disposal, and silver recovery program.
- + Saves considerable time when taking endodontic length films or check films during surgical/nonsurgical treatment.
- + Excellent educational tool for residencies and patients.
- + Provided immediate feedback which reduced time if a correction in radiographic technique was required.
- + Images can be printed to produce a hard copy, or e-mailed to consultants.
- + Images can be incorporated into lectures or notes.
- + Multiple copies of images can be made easily and efficiently compared to conventional film duplication.
- + Sensor size is appropriate with rounded corners for patient comfort (see sensor image at right).
- + Cord to sensor is offset which facilitates placement and makes the sensor more tolerable for patients.
- + Stiffness of sensor prevents image distortion.

**DISADVANTAGES:**

- Sensor is fragile: is easily damaged if dropped.
- Sensor is expensive.
- Intraoral-positioning device did not hold sensor securely: can result in sensor being damaged.
- Software package was not user-friendly.
- Upgraded software package decreased image quality.
- Quality of printed image degraded over time.
- System is bulky and difficult to assemble.

SUMMARY AND CONCLUSIONS:

The NI-DX System is a digital radiography system that offers many advantages compared to conventional radiographic film. Some of the important advantages include the ability to obtain an immediate image, the elimination of processing chemicals and traditional radiographic film, and a reduction in patient radiation exposure. The system also was an excellent tool for teaching and for patient education. The main shortcoming was the fragile nature of the sensor, which caused it to malfunction when mishandled. Image quality was considered good for endodontic applications, but the evaluator felt it would not be a good replacement for routine bitewing radiographs or a full mouth series where critical diagnostic information is required. The **NI-DX Digital Radiography System** is rated **Acceptable** for use by the federal dental services. Please note the NI-DX System is no longer marketed but the sensor has now been incorporated into the DenOptix Digital Imaging System (for review, see

58-19 Ariston pHc Alkaline Glass Restorative

(Project 99-09)

According to the manufacturer (Ivoclar/Vivadent), Ariston pHc is a light-activated alkaline-glass restorative material recommended for the restoration of Class I and II lesions in deciduous and permanent teeth. Company literature describes it as an "amalgam substitute" and claims that it is an "intelligent" restorative material because it releases protective calcium, fluoride, and hydroxyl ions when intraoral pH values drop below the critical 5.5 level. Ivoclar claims that Ariston can be adequately cured in bulk thicknesses of up to 4 mm. The material is contraindicated for anterior restorations or for use in non-retentive preparations. It is filled 79%/wt (59%/vol) with four types of filler particles (yttrbium trifluoride, barium-aluminimo-fluorosilicate glass, silanized alkaline glass, silanized dispersed silica) having an average size of 1.3 microns. Ariston pHc is available in unit-dose capsules ('Cavifils') and in syringes. The Cavifil package contains an innovative plastic dispenser gun (see picture). The product is also supplied with Ariston Liner which consists of hydroxyethyl methacrylate, polyacrylic acid, ethanol, and maleic acid. The liner is intended to desensitize tooth structure and is applied to enamel and dentin immediately before placing Ariston. Only one shade of Ariston is available. Material Safety Data Sheets for the restorative material and liner are packaged in the kit. A six-language instruction booklet and graphics-only picture guide are provided.



Ariston pHc is placed in traditional amalgam preparations with retentive features. No separate acid etching is performed. According to instructions, the liner is placed on enamel and dentin and allowed to remain undisturbed for 20 seconds. It is then air thinned and light cured for 20 seconds. Ariston is then placed in up to a 4-mm thickness and light cured for 40 seconds. Expiration dates, lot numbers, and recommended storage conditions are given for the Ariston restorative material and liner.

Manufacturer:

Ivoclar North America, Inc.
175 Pineview Drive
Amherst, NY 14228
(800) 533-6825
(716) 691-0010
(716) 691-2285 FAX

Suggested Retail Price:

\$190.00 Ariston pHc Alkaline Glass Restorative CaviFil Intro Package (item number 550686) contains:
-sixty 0.25-g CaviFils
-one 5-g bottle of Ariston Liner
-one CaviFil Injector
-plastic brush handle and disposable brushes

\$142.00 CaviFil Refill (item number 550687) contains:
-sixty 0.25-g CaviFils

Government Price:

\$81.00 Ariston pHc Alkaline Glass Restorative CaviFil Intro Package (contents and item number as listed above)

\$61.00 CaviFil Refill (contents and item number as listed above)

ADVANTAGES:

- + Cavifil tips have long nozzle which should facilitate direct placement.
- + Tips fit common gun dispensers (e.g., Caulk, 3M, Kerr).
- + Gun dispenser works very well; easier to use than those of other manufacturers.
- + Expiration dates, lot numbers, and recommended storage conditions are provided for all items in kit.
- + Is as hard as the hybrid composite resin measured in this study (Prodigy, Kerr Corporation).
- + Is sufficiently radiopaque to ensure easy detection on a radiograph.
- + Less expensive than most compomers and resin composites.

DISADVANTAGES:

- Ivoclar's claim that Ariston can be adequately light cured in a 4-mm thickness was not substantiated by DIS testing.
- In vitro testing showed moderate leakage at enamel and dentin/cementum margins.
- No published studies exist to confirm the product's purported ability to modify low intraoral pH conditions.
- Only one, quite opaque shade is available.
- Packaging box is large for amount of product provided.

SUMMARY AND CONCLUSIONS:

Laboratory testing of Ariston pHc yielded mixed results. Although it is adequately radiopaque for a posterior restorative material and is comparable in hardness to some currently-marketed resin-based restorative materials, it exhibited a measureable amount of leakage in vitro. The leakage was not unexpected because the material is not bonded to underlying tooth structure. An important negative laboratory finding is that Ariston can not be adequately polymerized by a light unit if it is placed in a 4-mm thickness as claimed by Ivoclar. In addition, the manufacturer's claim that Ariston's ability to raise low intraoral pH conditions and prevent caries by releasing protective calcium, hydroxyl, and fluoride ions has yet to be proven by peer-reviewed, published research. Until this claim has been substantiated by long-term in vivo studies, clinicians should be wary of unrestricted use of this material. **Ariston pHc** is rated **Marginal** for use by the federal dental services.

(Col Charlton, Lt Col Roberts)

58-20 Filtek™ Z250 Universal Resin Composite

(Project 99-10)

3M claims that Z250 Universal Resin Composite has enhanced optical properties, excellent handling characteristics, rapid curing (20 seconds for a 2.5-mm thickness), and low shrinkage. Z250 resin is based on the Z100 system which consists of Bis-GMA (Bisphenol A diglycidyl ether dimethacrylate) and a low-viscosity resin called TEGDMA (tri[ethylene glycol] dimethacrylate). Z250 differs in composition in that it contains a blend of UDMA (urethane dimethacrylate) and Bis-EMA (Bisphenol A polyethylene glycol diether dimethacrylate) in place of TEGDMA. This resin blend has a higher molecular weight that is said to reduce the polymerization shrinkage of Z250 as well as reduce aging effects and increase fracture toughness. Z250 is also purported to be quite hydrophobic and, therefore, less sensitive to atmospheric moisture.



Z250 is filled to 60 percent by volume with zirconia/silica particles having a size range of 0.01 to 3.5 microns and an average size of 0.6 micron. Compared to Z100, Z250 contains a greater number of smaller particles. 3M instructions recommend a short (20-second) light curing time for each 2.5-mm increment of most of the shades. The resin is available in 15 shades and has a three-year shelf life, according to 3M. It is recommended for anterior and posterior direct and indirect restorations.

Manufacturer:

3M
Dental Products Division
3M Health Care
3M Center, Bldg 275-2SE-03
St. Paul, MN 55144-1000
(800) 237-1650
(612) 733-8524
(800) 888-3132 FAX

Suggested Retail Price:

\$198.00 Filtek Z250 Universal Restorative System (item no. 6021)
-50 0.20-g capsules (10 each of shades A2, A3, B0.5, B2, C3; ten other shades are available separately)
-one 3-mL bottle of Single Bond Dental Adhesive
-one 3-mL syringe of 3M Scotchbond Etchant
-accessories

Government Price:

\$119.00 Filtek Z250 Universal Restorative System (item no. and contents as listed above)

ADVANTAGES:

+ Handles well; easy to place and manipulate.

- + Requires only a 20-second light exposure for adequate curing.
- + Can be placed and light-activated in a 2.5-mm thickness.
- + Shade match was rated highly by clinical evaluators.
- + Available in a broad range of shades.
- + Cavifils are individually stamped with shade and product name.
- + Cavifils have long nozzle that facilitates direct placement.
- + Capsules fit into other manufacturers' gun dispensers (e.g., Caulk, Kerr).
- + Excellent radiopacity; can easily be distinguished from enamel on radiographs.
- + Comparable in hardness to other hybrid resin composites.
- + Is supplied with an excellent easy-to-use dentin bonding product, Single Bond.
- + Has well-designed, graphics-containing instruction cards.

DISADVANTAGES:

- Considerably more expensive than several other popular resin composites.
- Users reported it did not polish to as high a luster as other resin composites they used.
- Expiration date on kit did not match those on individual components.

SUMMARY AND CONCLUSIONS:

Filtek Z250 resin composite was well-received by clinical users. They felt it handled well and produced esthetic restorations, although it didn't polish as well as other products they had used. Because of its reduced polishability, they felt it was better suited for use in less esthetically-demanding situations, such as in the posterior dentition. Some users reported that the five shades provided in the kit were too few, however it should be noted that ten other shades are available separately. The cost of Z250 should be taken into account when purchasing it because it is approximately 25% more expensive than 3M's other popular resin composite, Z100. **Filtek Z250** is rated **Acceptable** for use by the federal dental services.

(Col Charlton)

58-21 Pelton & Crane Spirit 2000 Ellipse Dental Unit (Project 98-54)

The Pelton & Crane Spirit 2000 Ellipse Dental Unit Model 2120 is an over-the-patient chair mounted dental operating system, which is compatible with the Pelton & Crane Model 2005 chair with ellipse mounting hardware. The control head is capable of supporting up to four air-driven handpieces and has a hinged panel to allow access to handpiece air adjustments, the fiber optic power supply, and to the control block for maintenance. An optional sealed touch pad control that mounts on the control head is available for controlling the dental chair and dental light functions. Other options include: a multi-position die-cast tray holder with stainless tray that provides 360 degrees of positioning, a self-contained water system, a circulating syringe and water heater, and the assistant's telescoping arm that can include high volume evacuation, saliva ejector and air water syringe. An intraoral light system is available and can be configured to accommodate up to three handpieces. The intraoral light system can be ordered in the standard, swivel quick-connect, or ISO-C light source tubing configurations. Right- to left-hand conversion is easily accomplished without tools. The Spirit 2000 is also available with the Continental (ie buggy whip) delivery system as well as a post-mounted utility center that includes a cup filler and a porcelain cuspidor. The unit's painted finish is power coated for durability and its smooth surfaces and rounded corners make cleanup easy. It has a 24-volt power supply that can support optional items such as a dental light, curing light and ultrasonic scaler. The 2000 Ellipse Dental Unit is ETL listed and complies with UL2601-1 and CSA standards. It is available in either 115-Volt or 230-volt AC.

Manufacturer:

Pelton & Crane
 11727 Fruehauf Drive
 P. O. Box 7800
 Charlotte, NC 28241-7800
 (800) 659-6560
 (704) 588-2126

(704) 588-6543 FAX

Suggested Retail Price:

Spirit 2000 Model 2120	\$4,235.00
Factory options:	
Touch pad control	425.00
Multi-position tray holder	135.00
Multi-tap transformer, 300 watts	250.00
Handpiece intraoral illumination system	820.00
Additional handpiece control	250.00
Ellipse assistant's instrumentation	795.00
Assistant's autoclavable syringe	130.00
Self-contained water system	115.00
Circulating syringe and water system	180.00
LFII Ellipse light on curved post	1900.00

Government Price:

Spirit 2000 Model 2120 Currently being negotiated.

ADVANTAGES:

- + Smooth, rounded aseptic design.
- + Durable power-coated finish.
- + Touch pad control available for the chair and light functions.
- + Has individual handpiece drive air and water adjustments.
- + Easy right-hand to left-hand conversion.
- + Hinged panel allows easy access for air adjustments and control block servicing.
- + Ability to flush an individual handpiece or all the handpieces at the same time.
- + Eight-conductor accessory wire allows field installation of optional devices.

DISADVANTAGES:

- The unit control head is difficult to position because of the stiffness of its mounting.
- The arm that mounts the unit to the chair interferes with the patient's feet when positioning the unit.
- Fiber optic lamp assembly adapter fits loosely in handpiece connection, may be dislodged while removing high-speed handpiece.
- The handpiece pressure gauge is not visible during normal operation.
- Handpiece holders do not securely hold the dental handpieces.
- Lamp intensity on fiber optics is not adjustable.
- The connection of the handpiece foot controller was omitted from the installation instructions.

SUMMARY AND CONCLUSIONS:

The Pelton & Crane Spirit 2000 Ellipse Dental Unit met all of the laboratory testing requirements of ADA Specification #47 and passed all NFPA 99 requirements but did not meet all the requirements of the Medical Procurement Item Description #2. Difficulty in positioning the unit control head along with some operational design problems earned the unit poor ratings from the clinical evaluators. Of the seven evaluators, one awarded it an overall rating of "Good", two rated it "Average", and four rated it "Poor". The **Pelton & Crane Spirit 2000 Ellipse Dental Unit** is rated **Marginal** for use by the federal dental services.

(Mr King, Lt Col Roberts, SSgt Martin, Col Leonard)

58-22 Pelton & Crane Spirit 2005 Dental Chair

(Project 98-55)

The Spirit 2005 Dental Chair is the newest offering in the Pelton & Crane line. The model evaluated by DIS was integrated with the Spirit 2120 Dental Unit. The Spirit 2005 is hydraulically powered and has

synchronous operation of the chair back and seat that reduces the need for patient realignment during positioning. The standard features of the chair include seamless upholstery, an articulating headrest, and lockable sliding armrests that facilitate patient entry and exit from the chair. Chair positioning is controlled via a five-position foot switch or a touch pad that is included on the control head of the unit.



The touch pad is illustrated with icons that indicate the four positioning functions (incline, recline, chair-up, and chair-down). Also featured on the touch pad are an icon for the light switch and two numerals that represent programmable positions. Designed to accommodate stand-up and sit-down dentistry, the Spirit 2005 features a modified traverse mechanism that is purported to eliminate the need

for patients to reposition themselves after being placed in the supine position. The touch pad or foot switch allows users to bring patients to an upright position for consultation, rinsing, or impression making; when activated again, the chair returns to its previous operating position. Four strategically located Internal Safety Switches discontinue the automatic chair-repositioning program if the chair encounters an obstacle. In addition, the Stop Motion feature allows the user to stop automatic repositioning program cycles by activating any of the keys that control the chair. A thin-profile, U-shaped back is purported to comfortably support the patient while increasing provider access. Other standard features include a clear-vinyl toeboard cover, sculptured foam cushioning on the back, seat, and headrest, and a painted finish on exterior metal surfaces. A swivel-brake lever located beneath the seat provides a 30° rotation in either direction for patient access and provider comfort. The chair measures 34 inches high by 87.5 inches long by 28 inches wide and has a shipping weight of 285 pounds. The Spirit 2005 can be configured in either 110 or 220 volts and is UL, ETL, CSA listed and IEC certified.

Manufacturer:

Pelton & Crane
PO Box 7800
Charlotte, NC 28241-7800
(800) 659-3212
(704) 587-7283
(704) 588-6543 FAX

Suggested Retail Price:

\$5,760 Includes seamless upholstery, five-position foot switch, removable articulating headrest, sliding armrests, clear vinyl toeboard cover, and standard swivel base.

Government Price:

\$3,168 Same as above.

ADVANTAGES:

+ Attractive and modern looking.

- + Stable in all operating positions.
- + Armrests were easy to move into and out of position.
- + Upholstery is easy to clean.
- + Touch pad and foot controls sealed for ease of disinfection.
- + Easily converted from right-hand to left-hand use.
- + Five programmable presets for patient positioning.
- + Adjustable articulating headrest.
- + Installation and maintenance manuals were well detailed.
- + Is UL, ETL, CSA listed and IEC certified.

DISADVANTAGES:

- Evaluators reported that the chair was uncomfortable for tall patients.
- Operational positions and foot controls were difficult to adjust.
- Clinical evaluators reported that the chair did not provide easy access for patients.
- Burrs and sharp edges of interior framework may damage electrical and water lines.
- Headrest attachment bolts could be felt by patients through padding.
- Operating instructions were judged by clinical evaluators to be incomplete.
- Failed to meet all requirements of military standard for dental chairs.

SUMMARY AND CONCLUSIONS:

The Pelton & Crane Spirit 2005 Dental Chair supports the patient during normal sit-down or stand-up dental procedures in either the upright or supine position. Although no safety hazards were reported, patients found chair access to be inconvenient. The sleek, modern design facilitates established infection control procedures such as disinfection and barrier protection. Standard seamless upholstery makes cleaning easy and relatively quick. Providers liked the esthetics, sliding armrests, and the ease of conversion from right- to left-hand use. Users found it difficult to adjust the chair's position using the foot control. The majority of evaluators reported that patients were often uncomfortable in the chair, especially those who were taller than average. Installation and maintenance instructions were complete, but evaluators found the operating instructions to be incomplete. The Spirit 2005 failed to meet all the requirements of the military standard for dental chairs due to the presence of burrs and sharp edges on the interior framework surfaces where the main wiring harness and waterlines were routed. DIS evaluators found the headrest padding to be inadequate. Eighty-three percent of evaluators rated the Spirit 2005 as "Poor" or "Unsatisfactory." The **Spirit 2005 Dental Chair** is rated **Marginal** for use by the federal dental services.

(SSgt Martin, Mr King)

58-23 Piezon Master 400

(Project 98-34)

The Piezon Master 400 is a piezoelectric ultrasonic scaler from Electro Medical Systems (EMS) that is purported to offer better scaling efficiency and to generate less heat than magnetorestrictive-style scalers. Piezoelectric scalers use a linear (back-and-forth) tip motion similar to the motion used during hand instrumentation with a curette. A unique feature of the Piezon Master 400 is its ability to automatically detect the load at the tip and compensate by adding or subtracting power. Two light emitting diodes (LED) on the front of the unit allow the user to tell at a glance when power is activated and which mode is engaged. The Piezon Master 400 is portable and does not require fixed air and water connections because it has a self-contained irrigation reservoir. The unit features a smooth, infection control-friendly exterior with integrated knobs for power and water adjustment. Although the Piezon Master 400 only comes with one detachable, color-coded, sterilizable handpiece, EMS offers an optional assortment of different handpieces and tips for different tasks. The tips are installed by threading them onto the handpiece with a tip wrench. In addition to the standard handpiece, the Piezon Master 400 comes with a variety of tips, a tip holder, an irrigation reservoir, and a corded foot pedal. The unit measures 4.75 inches high by 10 inches long by 9.5 inches wide and weighs 8 pounds. The Piezon

Master 400 is configured for 100/110 volts, 50/60 hertz and is CSA certified.

Manufacturer:

Electro Medical Systems (EMS)
670 International Parkway, Suite 100
Richardson, TX 75081
(800) 367-0367
(972) 690-8382
(972) 690-8981 FAX

Suggested Retail Price:

\$1,899.00 Piezon Master 400 scaler, detachable sterilizable handpiece, corded foot pedal, and instructions.

Government Price:

\$1,060.36 Piezon Master 400 scaler (same contents as above).

ADVANTAGES:

- + Full one-year warranty on parts and labor.
- + Comfortable for sensitive patients.
- + Good calculus removal.
- + Easy to use.
- + Unit is light and portable.
- + Autoclavable handpiece.
- + Self-contained irrigation reservoir eliminates need for fixed water connection.
- + Attractive design with smooth finish that facilitates asepsis.
- + Power adjustment controls are well placed.
- + Reduced noise level compared with other ultrasonic scalers.
- + Versatile, when used with optional handpiece systems.
- + Complete and clear operating, installation, and maintenance instructions.
- + Meets all electrical safety standards as outlined in AFI 41-201 and 41-203.
- + Is CSA certified.

DISADVANTAGES:

- Inconveniently located on/off switch.
- Learning curve for those who routinely use magnetorestrictive scalers.
- Changing tips is more labor intensive.
- Lacks a waterline disinfection protocol.

SUMMARY AND CONCLUSIONS:

The Piezon Master 400 is a piezoelectric scaler that is easy to use for dental prophylaxis procedures. When equipped with optional handpiece systems, the unit can be used for periodontal therapy, prosthodontics, cementation, periodontal surgery, apicoectomy, and endodontics. The simple, modern design of the unit facilitates established infection control procedures such as disinfection and barrier protection. Operating, installation, and maintenance instructions were complete and easy to follow. Providers liked the light weight and portability of the unit. A self-contained irrigation reservoir eliminates the need for fixed connections. The noise level of the Piezon Master 400 was rated "Excellent." Placement of the power adjustment controls were judged to be "Good." Evaluators identified the location of the on/off switch (located at the rear of the unit) to be less than ideal. Users found that changing the tips can be labor intensive. The Piezon Master 400 met all electrical safety standards of AFI 41-201 and 41-203. Although the Piezon Master 400 can be flushed with sodium hypochlorite, the manufacturer does not provide a waterline disinfection protocol. EMS acknowledges that there is a learning curve involved in the use of piezoelectric scalers and provides well-detailed instructions to assist novice users. Four out of five clinical evaluators rated the Piezon Master 400 as "Good" or "Excellent." The **Piezon**



Master 400 is rated **Acceptable** for use by the federal dental services.

(SSgt Martin)

58-24 Apollo 95E Curing Light

(Project 98-53)

The Apollo 95E Curing Light is a hand-held, corded, visible light polymerization unit. Rather than a conventional halogen bulb, the light is generated by a high-energy plasma lamp. The lamp is purported to provide adequate polymerization of dental materials in as little as one to three seconds rather than the usual 40 seconds required of conventional halogen curing lights. The unit consists of a wand-style handpiece connected to a power supply control unit via a six-foot flexible cord containing a liquid-filled fiberoptic line. A



foot pedal connected to the control unit is depressed to activate the light. Membrane touch pad controls on the front of the control unit allow selection of either a curing or tooth whitening mode and exposure times of 1,2,3 seconds, or a stepped-cure mode of two seconds at low intensity followed by four seconds at high intensity. The unit is supplied with two removable curing tips (an 8-mm, curved tip and an 8-mm straight tip) that can be sterilized or disinfected between uses. The power control unit measures 4"H x 12"W x 11"D and weighs 14 pounds.

Manufacturer:

Dental/Medical Diagnostic Systems, Inc (DMD)
200 N. Westlake Blvd., Suite 202
Westlake Village, CA 91362
(800) 399-0999
(805) 381-2700
(805) 374-2137 FAX

Suggested Retail Price:

\$4500.00 Includes: Apollo 95E, 8-mm-diameter curved fiberoptic light tip, 8-mm-straight fiberoptic light tip, foot control, and protective light shield.

Government Price:

\$4500.00 Includes: same as above.

ADVANTAGES:

- + Had higher measured irradiance values than any other unit previously tested by DIS.
- + Faster curing than conventional halogen curing lights.
- + Sterilizable curing tips.
- + Internal voltage regulator.
- + Contains stepped-cure mode.
- + Cooling fan operation is proportional to bulb usage.
- + Easily cleaned or barrier protected.

DISADVANTAGES:

- Doesn't polymerize resin composite in as short a time as advertised.
- Operator instructions are incomplete and confusing.
- Doesn't have a built-in radiometer.
- Only one size curing tip is available.
- Protective light shield does not fit handpiece correctly and is difficult to position.
- Much more expensive than conventional halogen curing light.
- Replacement bulb is very expensive.
- Clinical users found wand handpiece and cord were heavy, poorly balanced, and more difficult to use than gun-type curing lights.
- Clinical evaluators disliked foot pedal activation.
- Curing tip is secured to handpiece magnetically and frequently came loose.
- All exposure times and curing modes are selected at the power unit; more convenient handpiece controls are not available.
- Leakage current exceeds National Fire Prevention Association (NFPA 99) electrical safety requirements for medical/dental equipment used within a six-foot radius of patients.

SUMMARY AND CONCLUSIONS:

The Apollo 95E Curing Light is a high-intensity unit designed to expedite the polymerization of light-cured materials. Its irradiance (2494 mW/cm²), which is approximately four times greater than conventional halogen curing lights, helps it cure light-activated materials faster. Although the manufacturer claims a 1 to 3 second cure, DIS laboratory testing found that 13 seconds (includes lamp cooling delays) were required to adequately polymerize a 2-mm-thick layer of resin composite. Clinical evaluators appreciated the shorter curing time and quiet operation, but did not like the wand-style handpiece or the foot pedal activator. The protective light shield did not fit the handpiece well and clinical users found that the magnetically-held curing tip was not securely fixed to the handpiece. The unit's voltage regulator allowed consistent irradiance over a wide range of voltages, and the curing tip was unaffected by repeated sterilization in an autoclave. The Apollo 95E's leakage current exceeds recommended NFPA 99 electrical safety levels and would require 3-month re-evaluations if used in DoD facilities. Overall, four of eight clinical evaluators rated the Apollo 95E as "Good," three rated it as "Average," and one rated it as "Fair." The **Apollo 95E Curing Light** is rated **Marginal** for use by the federal dental services.

(Col Leonard, Mr. King)

58-25 Synopsis of Automatic X-ray Processors**(Project 98-38)**

There are many advantages to using automatic X-ray processors during dental treatment. Some of these include reduced processing time, consistent film quality, and the elimination of wet film reading. Also, automatic processors use compact equipment that takes up less floor and/or counter space than dip-tank equipment does. Automatic film processors come in two basic styles: small tabletop units that process intraoral films only, and larger roller/belt transport models capable of processing occlusal, panoramic, and cephalometric films. The number and type of radiographs to be processed should determine the style of processor to be purchased.

The basic mechanism in an automatic processor consists of a series of rollers or belts that transport the film through various sections containing developer solution, fixer solution, and wash water. The film then goes through a dryer section. The chemicals used in automatic processing are specially designed to be used with these machines. They operate at higher temperatures and do not require film rinsing between the developer and fixer. Solution brands should not be substituted or changed unless recommended by the manufacturer of the automatic processor.

Automatic film processors can vary by the way in which they are plumbed. Some automatic processors are connected to the standard plumbing system, while other units operate without plumbing. An important part of obtaining high-quality films with these processors is ensuring that the developer and

fixer solutions are replenished as necessary. Many units have automatic replenishing systems that deliver fresh developer and fixer as films are processed. Keep in mind that silver recovery is mandatory for all units because of environmental concerns about silver being discharged into the wastewater stream.

The majority of problems with radiographs are due to improper film processing. To a great degree, these problems can be prevented by properly maintaining the processing unit and the chemicals it contains. For example, the main cause of automatic processing problems is failure to keep the rollers or transport module clean. It is essential that automatic processors be cleaned regularly and that preventive maintenance procedures be followed. Most processors require that the rollers or transport module be disassembled periodically and cleaned to prevent processing artifacts on radiographs and the loss of films during transport. Regular lubrication is required for the motor that drives the rollers using gears or chains to avoid machine breakdown as well. All automatic processors must be maintained on a strict basis exactly as recommended by the manufacturer.

This synopsis consists of a table (Attachment 1) which is a list of selected automatic X-ray processors, their manufacturers, and basic features. Factors to consider before purchasing include: cost, maintenance, countertop space required, plumbing connections, and the availability of a daylight loader (ie, a compartment in which films can be unwrapped and fed into the machine without working in a darkroom).

(Col Bartoloni)

58-26 Implant Recall Kit

(Project 98-46)

The Implant Recall Kit is a kit of instruments used for hygiene maintenance of dental implants. The Kit contains one 20-gram tube of Implant Cleanic Paste, one PerioWise probe, one Universal Implant Scaler, and one Facial Implant Scaler. The Implant Cleanic Paste is a specially formulated, non-abrasive, mint-flavored paste for polishing implant surfaces. The PerioWise probe is a plastic, color-coded probe that is available in either 3-5-7-10 or 3-6-9-12 millimeter graduations. Both the Universal and Facial Implant Scalers are made of a high-carbon plastic that is purported to cause no harm to titanium implants. All instruments can be resharpenered and are autoclavable.



Manufacturer:

Premier Dental Products Company
P.O. Box 61574
King of Prussia, PA 19406
(888) 773-6872
(610) 239-6000
(610) 239-6171 FAX

Suggested Retail Price:

\$55.85

Government Price:

\$33.50

ADVANTAGES:

- + Demonstrated similar quality to the more expensive graphite implant scalers.
- + Appeared to be more effective in removing calculus than Teflon scalers.
- + Instruments could be resharpened and autoclaved.
- + Instruments were lightweight and easy to grasp.
- + Scalers can be used multiple times (9 to 10 patient uses) before degrading.
- + Paste was convenient to use.
- + Patients liked the mint flavor of the paste.

DISADVANTAGES:

- Scaler tips were bulky and difficult to place subgingivally.
- More flexible than metal scalers.
- Paste and probe must be purchased with kit.

SUMMARY AND CONCLUSIONS:

The Implant Recall Kit was rated favorably by a majority of evaluators. The kit contains all items necessary for providing periodontal maintenance for patients with tissue-integrated dental implants. The evaluators found no deleterious effects to titanium implants while using the scalers or probe. The instruments withstood multiple steam autoclave processes, and were easy to sharpen. Average use life was determined to be 9 to 10 appointments. One evaluator felt the scalers were more effective in removing calculus than Teflon scalers, and were of similar quality as more expensive graphite implant scalers. The main shortcoming was the bulkiness of the scaler tips, which made subgingival placement difficult. Also, half of the evaluators recommended that the paste and periodontal probe be deleted from the kit and be available separately. The **Implant Recall Kit** is rated **Acceptable** for use by the federal dental services.

(Col Bartoloni)

58-27 DenOptix Digital Imaging System

(Project 98-36)

The DenOptix Digital Imaging System is a cordless digital radiographic unit that uses photo-stimulated phosphor technology to produce radiographic images instead of the more traditional digital method that uses a Charge-Coupled Device (CCD). The sensor and cable utilized with the CCD is replaced by reusable imaging plates. The reusable imaging plates are positioned like traditional radiographic film. Film sizes include panoramic, cephalometric and full-sized 0, 1, 2, 3, 4. The imaging plates use a high-speed laser scanner to convert the data into electron bits so that the DenOptix software can create files for viewing on a computer monitor. Reading times range from 1 minute 26 seconds for intraoral plates to 2 minutes 55 seconds for panoramic plates, and 4 minutes for cephalometric plates. After the scanning process is complete, the imaging plates are erased by exposing them to a light source (conventional light box). The manufacturer claims the imaging plates can be reused for thousands of cycles. The plates are much less sensitive than conventional radiographic film and can be exposed to low-level light without losing imaging quality. Disposable barrier envelopes protect the imaging plates while providing asepsis. If contaminated, they can be chemically disinfected.



Images, which are easily duplicated, can be stored on a hard drive, optical disk, magnetic tape, printed to a standard laser printer, or exported to other providers. Software enhancement capabilities include: zoom, colorization, smooth, emboss, brightness/contrast, positive/negative, sharpen, isodensity, measurement, notes, and export. The DenOptix System allows for a wide range of acceptable exposure times. Any AC or DC intraoral, panoramic, or cephalometric radiographic unit can be used with the DenOptix System to produce radiographic images. The DenOptix System can be used as a stand-alone unit or networked, and is capable of being integrated into any existing dental office management software package. A CCD sensor can be added as an option.

Manufacturer:

Dentsply Gendex
901 West Oakton Street
Des Plaines, IL 60018
(800) 800-2888
(847) 640-5323
(847) 640-6165 FAX

Suggested Retail Price:

\$21,528.00 DenOptix Combo Scanner System
-DenOptix Laser Scanner
-Panoramic/Intraoral carousels
-VixWin Software
-500 barriers
-1 panoramic plate
-20 intraoral imaging plates (4 sz 0, 2 sz 1, 12 sz 2, 2 sz 3)

Government Price:

\$14,000.00 DenOptix Combo Scanner System (contents as listed above)

ADVANTAGES:

- + Cordless system.
- + Easy to position imaging plates.
- + Variety of imaging plate sizes.
- + Laser scanner performed flawlessly.
- + Good backup if conventional radiographic system fails.
- + Reduced exposure time.
- + Convenient measuring system when providing endodontic treatment.

DISADVANTAGES:

- Footprint is large.
- Provided software did not behave like typical windows software.
- Mix of film sizes on the scanner carousel was not always convenient.
- Having one monitor limited viewing capabilities.
- Poor quality of printed images.
- Not DICOM (Digital Imaging and Communications in Medicine) standardized.

SUMMARY AND CONCLUSIONS:

The DenOptix Digital Imaging System is a cordless storage phosphor system that eliminates the sensor and cable necessary for operation with CCD technology. Among its advantages are that it reduces patient radiation exposure and eliminates the need for film processing equipment, developing chemicals, and a dark room. The evaluator felt the system performed reasonably well as a stand-alone unit, but having one viewing station meant the image could not be viewed on multiple separate computer monitors such as in a group practice. The monitor image quality was comparable to traditional radiographic film but hard copy images were not of diagnostic quality. The system is not DICOM (Digital Imaging and Communications in Medicine) standardized, reducing compatibility between facilities. The

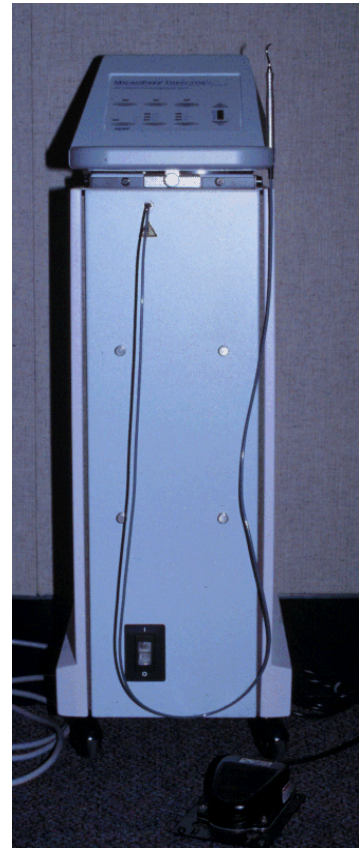
DenOptix Digital Imaging System is rated **Acceptable** for use by the federal dental services.
(Col Bartoloni)

58-28 Lares Director+ Air Abrasion System

(Project 98-51)

The Director+ is a self-contained air abrasion system manufactured by the Lares Research Company. Air abrasion provides an alternative to the highspeed handpiece for tooth preparation. Lares reports the unit can be used for composite preparations; removing composite restorations; etching enamel, dentin and porcelain for bonding; and pit and fissure sealants. Other advertised clinical applications include tunnel preparations, preparing teeth for facial veneers, air abrasion of both precious and non-precious metals prior to cementation, preparation of acrylic surfaces prior to repair, and desensitization treatment for sensitive cervical erosions. A listed contraindication is the removal of amalgam restorations. Lares claims the unit provides less invasive, more conservative treatment than a traditional air-turbine handpiece and reduces the need for local anesthesia.

The Director+ is used with 27-micron aluminum oxide powder. Air pressure is supplied from an internal self-contained, oil-less compressor that provides from 40 to 120 psi. The arrow touchpad controls allow the user to regulate the air pressure (40 to 120 psi), cutting time (pulse mode [two seconds abrasive, one second air] vs. continuous mode), powder rate (low, medium, high), nozzle selection (small, medium, large), and standby or ready mode. The control panel also features a pressure bar indicator and a low- powder indicator. Handpiece nozzles are available in three different orifice diameters (0.015", 0.019", and 0.026") for increased versatility. The Director+ measures 35.5"H x 14"D x 9.5"W and weighs 94 pounds. The unit is available in 110V and 220V models, and is UL listed and CSA certified.



Manufacturer/Source:

Lares Research
295 Lockheed Avenue
Chico, CA 95973
(800) 347-3289
(530) 345-1767
(530) 345-1870 FAX
www.laresdental.com

Suggested Retail Price:

\$15,995.00 Includes: QuikEvac evacuator, three pounds of 27-micron aluminum oxide powder, one autoclavable handpiece, three autoclavable nozzles, four pairs of safety glasses, autoclavable evacuation nozzle, and owner's manual including operating instructions.

\$14,995.00 Director+ Air Abrasion system without QuikEvac evacuator.

Government Price:

\$13,595.75 Includes: Same as above.

Director+ Air Abrasion System without QuikEvac evacuator price to be determined by negotiation with Lares Research.

ADVANTAGES:

+ Portable, self-contained unit is easy to move from operatory to operatory.

- + Multiple nozzle angulations and orifice diameters provide easy access to all intraoral locations.
- + Logical, organized membrane touchpad controls.
- + Autoclavable handpiece and nozzles.
- + Multiple air pressure settings to facilitate a range of treatments.
- + Dessicant filter provides moisture control to prevent clumping of abrasive powder.
- + Pulse or continuous cutting modes.
- + Quiet operation [67 dB(A)].
- + Excellent instructional manual.
- + Easily cleaned or barrier protected.
- + UL listed and CSA certified for electrical safety.

DISADVANTAGES:

- Expensive.
- Powder overspray is messy and limits view of working area.
- Air abrasion offers limited clinical indications over highspeed handpieces for the general dental practice.
- Not effective in removing soft caries.
- Initially, depth and width of tooth preparations can be difficult to control until user gains experience with unit.
- Loss of tactile feel during tooth preparation.

SUMMARY AND CONCLUSIONS:

The Director+ is a well-designed, easy-to-use, mobile air abrasion system with an on-board compressor and auxiliary QuikEvac intra-oral evacuation system. The autoclavable handpiece and nozzles come in three angulations and three orifice diameters for increased procedure flexibility and access to all tooth surfaces. The clinical evaluators reported that the Director+ functioned well and was easy to learn to use. They also reported that the unit effectively removed tooth structure as advertised but that air abrasion in general had limited indications. All evaluators reported that patients were comfortable without local anesthesia, but air abrasion was only used for a narrow scope of treatment during this evaluation. Although the clinical evaluators felt it would be beneficial if air abrasion was routinely available in all Air Force clinics, concern was expressed due to its limited indications and high cost. However, the Director+ was judged favorably by the evaluators and met or exceeded the minimal requirements established by DIS. The **Lares Director+ Air Abrasion System** is rated **Acceptable** for use by the federal dental services.

(Lt Col Roberts)

Synopsis of Automatic X-Ray Processors (page 1 of 3)

Model	Velopax - Extra X	Velopex - Lynx	Velopex Intra-X
Manufacturer	Medivance Instruments Ltd		
Technical Services	Brian Rough 136 Main St Catawissa PA 17820		
Phones	(888) 700-2312, (570) 356-2614, (570) 356-2613 FAX		
Government Representative	Tony Urella		
Marketing Information	136 Main St Catawissa PA 17820		
Phones	(888) 835-6739, (570) 356-2614, (570) 356-2613 FAX		
Retail Cost	\$5,850.00	\$5,850.00	\$2,295.00
Government Cost	\$2,632.50	\$2,632.50	\$1,147.50
Procurement Information	N/A	N/A	N/A
FDA	Exempt	Exempt	Exempt
Electrical Approval	UL, ETL, CSA, CE, ISO 9000	UL, ETL, CSA, CE, ISO 9000	UL, ETL, CSA, CE, ISO 9000
ADA	None	None	None
Electrical Rating	110V, 12 amp	110V, 12 amp	110V, 8 amp
Electrical Requirements	Preferably isolated, 15 amp circuit	Preferably isolated, 15 amp circuit	Preferably isolated, 15 amp circuit
Additional Voltages	60 cycle/110V 50 cycle/220V 60 cycle/220V	60 cycle/110V 50 cycle/220V 60 cycle/220V	60 cycle/110V 50 cycle/220V 60 cycle/220V
Plumbing Requirements	Machine is ready to be connected to cold water supply and should have a standing waste line. There is an optional (no plumbing) water supply kit available for \$210.00 (gov't)	Machine is ready to be connected to cold water supply and should have a standing waste line. There is an optional (no plumbing) water supply kit available for \$210.00 (gov't)	No
Recirculate			
Fixer	Yes	Yes	No
Developer	Yes	Yes	No
Wash water	Yes	Yes	No
Endo Mode/Time	Yes/2 min archival	None	Yes/2 min archival
Processing Time/Adjustable	4 min dry to dry/No	2 min dry to dry/No	4 min dry to dry/No
Film Processed	Intra-oral and extra-oral	Panoramic and cephalometric	Intra-oral and occlusal
Daylight Loader/Cost	Yes/\$300.00 (gov't)	Yes/\$300.00 (gov't)	Yes/\$106.20 (gov't)
Requires Specific Developer/Fixer	None	None	No
Separate Drain	Yes - may be used in closed-loop system	Yes	No
Heater	Fixer & developer	Fixer & developer	Fixer & developer
Dimensions	12½" X 19¾" X 15" (26" w/ loader)	12½" X 19¾" X 15" (26" w/ loader)	11¾" X 11" X 14¾" (21¾" w/ loader)
Weight	40 lbs/66 lbs with chemicals	40 lbs/66 lbs with chemicals	16½ lbs/26½ lbs with chemicals
Warranties	1 Year, 2 Years/Module	1 Year, 2 Years/Module	1 Year, 2 Years/Module
Training Aids			

Synopsis of Automatic X-Ray Processors (page 2 of 3)

Model	Velopex Intra-XE	Velopex - Sprint	810 Basic	Excel	GXP (110-0096 G3/G4)
Manufacturer	Medivance Instruments Ltd		Dent-X		Gendex
Technical Services	Brian Rough 136 Main St Catawissa PA 17820		Donald Hill 250 Clearbrook Rd Elmsford NY 10523		901 W Oakton St Des Plaines IL 60018
Phones	(888) 700-2312, (570) 356-2614, (570) 356-2613 FAX		(914) 592-6100, (914) 592-6148 FAX		(800) 769-2909 (847) 640-4800 (847) 640-5310 FAX
Government Representative	Tony Urella		Raffi Frank		Linda Allen
Marketing Information	136 Main St Catawissa PA 17820		250 Clearbrook Rd Elmsford NY 10523		901 W Oakton St Des Plaines IL 60018
Phones	(888) 835-6739, (570) 356-2614, (570) 356-2613 FAX		(914) 592-6100, (914) 592-6148 FAX		(800) 800-2888 (847) 640-4891 FAX
Retail Cost	\$1,995.00	\$1,795.00	\$5,665.00	\$6,300.00	\$6,035.00
Government Cost	\$997.50	\$897.00	37% discount	37% discount	\$2,647.00
Procurement Information	N/A	N/A	VA Contract #V797P-3572-K DSCP Stock # 9992405000	VA Contract #V797P-3572-K DSCP Stock # 9992407000	VA Contract #V797P-3682K Stock # A0400/A0400S
FDA	N/A	Exempt	510 K – PMA	510K	501 K - K932675 July 26, 1993 PMA - July 7, 1993
Electrical Approval	UL, ETL, CSA, CE, ISO 9002	UL, ETL, CSA, CE, ISO 9000	UL, ETL, CSA, CE, ISO 9001	UL, ETL, CSA, CE, ISO 9001	UL CSA, IEC, CA 219A
ADA	None	None	Acceptance	Acceptance	
Electrical Rating	110V, 8 amp	110V, 5 amp	110V		115V, 15 amp
Electrical Requirements	Preferably isolated, 15 amp circuit	Preferably isolated 15 amp circuit			
Additional Voltages	60 cycle/110V 50 cycle/220V 60 cycle 220V	60 cycle/110V 50 cycle/220V 60 cycle 220V	50 cycle/110V 50 cycle/220V 50 cycle/100 V 60 cycle/110V	50 cycle/110V 50 cycle/220V 50 cycle/100V 60 cycle/110V	50 cycle/220V
Plumbing Requirements	No	None			Self contained
Recirculate			Built-in chemical agitations	Built-in chemical agitations	
Fixer	No	No			Yes
Developer	No	No			Yes
Wash water	No	No	Yes (can be closed loop)		Yes
Endo Mode/Time	No/2¼ min archival	No	Yes/2 min	Yes/2 min	Yes/2 min
Processing Time/Adjustable	5½ min dry to dry/No	2 min wet to wet archival/No	4½ & 6 min/Yes	4½ & 6 min/Yes	5 min/No
Film Processed	Intra-oral and occlusal	Intra-oral and occlusal	All film sizes from 0 through 8 X 10 inch	All film sizes from 0 through 8 X 10 inch	Sizes 0, 1, 2, 3, 4, panoramic, cephalometric 8 X 10
Daylight Loader/Cost	Yes/\$106.20 (govt)	Yes/included	Yes (option)/\$318.15 (govt)	Yes (option)/\$318.15 (govt)	Yes
Requires Specific Developer/Fixer	No	No	No	No	No
Separate drain	No	No	Yes	Yes	Yes
Heater	Fixer & developer	Fixer & developer	Fixer & developer	Fixer & developer	Developer
Dimensions	11¼" X 11" X 14¾" (21¾" w/ loader)	16¾" X 7 7/8" X 11"	14½" X 17½" X 30½"	14½" X 17½" X 30½"	16" X 17" X 28"
Weight	16½ lbs/26½ lbs with chemicals	15 lbs/ 22½ lbs with chemicals	80 lbs	80 lbs	70 lbs
Warranties	1 Year	1 Year	1 Year	1 Year	2 Years
Training Aids					

Synopsis of Automatic X-Ray Processors (page 3 of 3)

Model	A/T 2000 XR	Peri-Pro #9000	Peri-Pro III #94000
Manufacturer	Air Techniques Inc		
Technical Services	70 Cantiague Rock Road, Hicksville NY 11802-1163		
Phones	(800) 247-8324, (516) 433-7676 (516) 433-7684 FAX		
Government Representative	Eugene Heil		
Marketing Information	PSA Government Sales 345 Market Place, Suite 103 Roswell GA 30075		
Phones	(770) 552-7664, (770) 552-8557 FAX		
Retail Cost	\$6,295.00	\$2,095.00	\$2,295.00
Government Cost	\$3,299.77	\$925.99	\$1,052.62
Procurement Information	VA Contract V797P-3679K (12/1/98-11/30/03)	VA Contract V797P-3012K	VA Contract V797P-3012K
FDA	None required, grandfathered	Yes, grandfathered	Yes, grandfathered
Electrical Approval	UL	UL	UL
ADA	None	None	None
Electrical Rating	115V, 60 Hz, 8 amps	115V, 5 amps	115V, 5 amps
Electrical Requirements	115V dedicated 15 amp line recommended	115V, 5 amps	115V, 5 amps
Additional Voltages	50 cycle/110V 60 cycle/110V 50 cycle/220V	N/A	N/A
Plumbing Requirements	Water pressure 30 - 80 psi Flow ½ gal/min when processing Water temp 55 - 80 F Drain PVC construction	None required	None required
Recirculate			
Fixer	No	No	No
Developer	No	No	No
Wash water	Yes, with optional system	No	No
Endo Mode/Time	Yes/2½ min	No	No
Processing Time/Adjustable	5½ min/No	7½ min	5 min
Film Processed	All dental film sizes, panoramic, cephalometric, TMJ; occlusal, perapical	sizes #0, #1, #2, #3, #4	sizes #0, #1, #2, #3, #4
Daylight Loader/Cost	Yes/\$476.72 (govt)	Yes (\$118.72)	Yes (\$118.72)
Requires Specific Developer/Fixer	No	Yes Air Techniques Peri-Pro Chemistry	Yes Air Techniques Peri-Pro Chemistry
Separate Drain	Yes	No	No
Heater	Fixer & developer	No	Fixer & developer
Dimensions	18" X 15" X 25"	8½" X 10" X 25"	8½" X 10" X 25"
Weight	90 lbs	20 lbs	22 lbs
Warranties	1 Year, 2 Years/Modules	1 Year	1 Year
Training Aids	Video included with each processor		